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ON THE IDENTITY OF
ARCHIULUS? GLOMERATUS SCUDDER, 1890,
A SUPPOSED MILLIPED (DIPLOPODA: XYLOIULIDAE)
FROM THE PENNSYLVANIAN OF ILLINOIS

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ABSTRACT

One of the two syntypes of the species *Archilus? glomeratus* Scudder, 1890, is a xyloiulid millipede, but the other specimen belongs to the syncarid crustacean species *Acanthotelson stimpsonii* Meek and Worthen, 1865. The millipede is designated the lectotype of the species, which is assigned tentatively to the genus *Xyloiulus* Cook, 1895.

Introduction

The history of the study of fossil myriapod arthropods is replete with misidentifications at high taxonomic levels. This is understandable, as millipeds and centipeds superficially resemble other taxa, especially those with coiled parts or which bear a series of similar-looking segments.

When coiled or preserved as single segments, fossil millipeds may resemble plant parts. This has led to several specimens of fossil ferns being described as millipeds. *Palaeojulus dyadicus* Geinitz, 1872, a supposed millipede, was reinterpreted as a fern soon after its description (Scudder, 1886b, p. 17), as were Samuel Scudder's species of the supposed myriapod genus *Trichiulus* Scudder, 1884 (Scudder, 1886a; Scudder 1886b, p. 17). More recently, Hoffman (1969, p. R605) identified the supposed millipede *Julopsis cretacea* Heer, 1874, as a fern.

Myriapods have also been confused with various other

types of segmented animals, including annelid worms, onychophorans, and arachnids. Scudder (1882a) identified *Palaeocampa* Meek and Worthen, 1865, which was originally described as a caterpillar, as a myriapod. Later Fritsch (1907) reinterpreted *Palaeocampa* as a polychaete annelid. Recent authors have come to the same conclusion (Hoffman, 1969, p. R605; Rolfe et al., 1982; Fitzhugh et al., 1997). *Ilyodes* Scudder, 1890a, was originally described as a chilopod, but was subsequently identified as an onychophoran by Rolfe et al. (1982; see also Hay and Kruty, 1997, p. 217). *Necroganmarus sawweyi* Woodward, 1870, a form that had been referred to as an early myriapod, has only recently been identified as a eurypterid (Selden, 1986).

Fossils of Crustacea with multiple abdominal and thoracic segmentation often bear a close resemblance to fossil myriapod arthropods. Both types of arthropods are also often found in the same rock units. Thus it is not surprising

that Scudder assigned a number of crustacean specimens to two "species" of his supposed chilopod genus *Eileticus* Scudder, 1882b. Hoffman (1969, p. R604) noted that this genus was based on "purported myriapod remains." However, Brooks (1962, p. 258) considered the holotype of *Eileticus anthracinus* Scudder, 1882b, to be a fossil of a typical myriapod and Shear (1997, p. 213), citing Mundel (1979), recently noted that *Eileticus* may be a geophilomorph. Mundel (1979, p. 377) had referred to possible chilopod material which included *Eileticus* (?) *antiquus* Matthew, 1894. That material, however, is in need of reevaluation. Both Brooks (1962, p. 258) and Schram (1984, p. 207) considered the material referred to *Eileticus* by Scudder (1890a, 1890b), with the exception of the holotype of *Eileticus anthracinus*, to belong to the syncarid *Acanthotelson stimpsonii* Meek and Worthen. The case of *Eileticus* is complex; more information on the recent history of the taxonomy of the genus can be found in Brooks (1962) and Schram (1984).

Scudder was not the only worker who may have confused Crustacea with myriapod arthropods. Anton Fritsch briefly described a "lithobiid?" (1910, p. 7) specimen from the Cretaceous of the Czech Republic, noting that interpretation of this specimen was difficult. He did not name this species. Fritsch's figure (1910, Pl. 4, fig. 12) of this specimen resembles that of a crustacean. Unfortunately, the specimen itself, which is preserved in the collections of the Národní Muzeum, Prague, is too poorly preserved for identification.

The purpose of this paper is to illustrate and redescribe the syntypes of *Archiliulus? glomeratus* Scudder, 1890a, and to designate a lectotype so as to resolve the taxonomic placement of the species. This is necessary as the syntypes belong to two different classes of arthropods.

Scudder referred two specimens from the Mazon Creek fauna to this new "archipolypod" species *Archiliulus? glomeratus* in 1890. He described one specimen as a "moderately large galley-worm" [millipid] with 18 or 19 segments and long, stout, legs. The other, which he was "inclined to place in the same species" was a smaller, but seemingly more complete, specimen. One of these two specimens (the "moderately large galley-worm") is, in fact, a syncarid crustacean, complete with a raptorial appendage. That specimen is partly coiled, only superficially resembling a coiled millipid. The other specimen of *Archiliulus? glomeratus*, which Scudder was "inclined to place in the same species," is in fact a coiled, cylindrical, helminthomorph millipid.

Systematic Paleontology

Class MALACOSTRACA Latreille, 1806

Subclass EUMALACOSTRACA Grobben, 1892

Order SYNCARIDA Packard, 1885

Suborder PALAEOCARIDACEA Brooks, 1962

Family ACANTHOTELSONIDAE Meek and Worthen, 1865

Genus *ACANTHOTELSON* Meek and Worthen, 1865

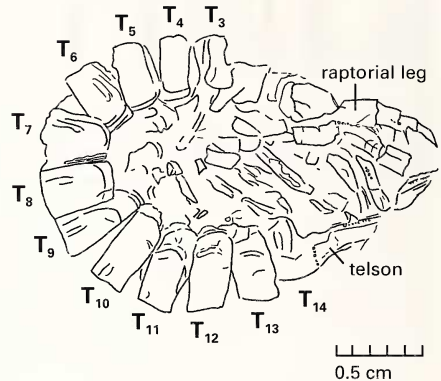


Figure 1. *Acanthotelson stimpsonii* Meek and Worthen, 1865, paralectotype of *Archiliulus? glomeratus* Scudder, 1890a, USNM 37993. Camera lucida drawing of part of specimen seen in Figure 2A, with several parts identified; T = thoracopere.

Diagnosis

"Second and third thoracopods raptorial. Telson and uropods styliform." (From Schram, 1984, p. 205.)

ACANTHOTELSON STIMPSONII Meek and Worthen, 1865
Figures 1–2

Acanthotelson Stimpsonii MEEK AND WORTHEN, 1865, p. 47–48.

Acanthotelson Stimpsoni MEEK AND WORTHEN, 1866, p. 401, Pl. 32, fig. 6; MEEK AND WORTHEN, 1868, p. 549–550, figs. a–b; WHITE, 1884, p. 176–177, Pl. 37, figs. 4–5.

Acanthotelson stimpsonii SCHRAM, 1984, p. 205–207, fig. 9, Pl. 1, figs. c–e, Pl. 2, fig. a; SCHRAM, ROLFE, AND HAY, 1997, p. 158, figs. 12.8–12.9.

Acanthotelson Eveni MEEK AND WORTHEN, 1868, p. 551, figs. a–d; WHITE, 1884, p. 177–178, Pl. 38, figs. 4–7.

Eileticus anthracinus SCUDDER, 1890a, p. 420–421, Pl. 38, fig. 5; SCUDDER, 1890b, p. 396–397, Pl. 30, fig. 5.

Eileticus aequalis SCUDDER, 1890a, p. 421, Pl. 38, figs. 6–9; SCUDDER, 1890b, p. 397, Pl. 30, figs. 6–9.

Archiliulus? glomeratus SCUDDER, 1890a, p. 436–437, Pl. 37, fig. 2; SCUDDER, 1890b, p. 412–413, Pl. 29, fig. 2 (new synonymy).

Archiliulus glomeratus SCUDDER, 1891, p. 10 (in part; new synonymy).

For additional synonyms see Schram, 1984, p. 205–206.

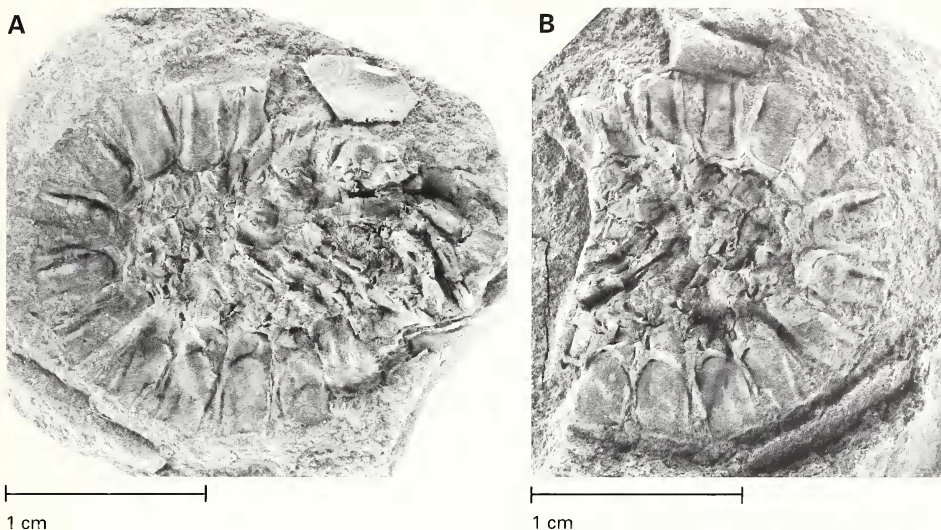


Figure 2. *Acanthotelson stimpsonii* Meek and Worthen, 1865, paralectotype of *Archinlus? glomeratus* Scudder, 1890a, USNM 37993. A, remains preserved in one half of concretion; B, remains preserved in other half of concretion.

Material studied

USNM 37993; collected by J. C. Carr, originally numbered 1823a/b in the Lacoe Collection (Scudder, 1890a, p. 437; Scudder, 1890b, p. 413). Collected at Mazon Creek, Grundy Co., Illinois, from the Francis Creek Shale, Westphalian D in age. Preserved in concretion.

Description of specimen

Moderate size for species. Cephalon incomplete. Third through 14th thoracomeres more or less well preserved. Average dimensions of thoracomeres 2 mm long and 4 mm high; first three preserved thoracomeres increasing gradually in size. Posterior of 14th thoracomere spinose. Presumed antennal peduncle with spine bases along length and at points of articulation. Raptorial leg prominent, spinose. Walking legs robust. Telson and uropods probably styliform, with spines of varying sizes along length.

Remarks

Three species belonging to the family Acanthotelsonidae are found in the Mazon Creek fauna: *Acanthotelson stimpsonii* Meek and Worthen, 1865; *Palaeocaris typus* Meek and Worthen, 1865; and *Palaeosyncaris micra* Schram, 1984. The seemingly styliform telson and uropods of the specimen described above indicate that it belongs to the species *A. stimp-*

sonii. The specimen also displays the stout raptorial spines of that species (Meek and Worthen, 1868, p. 551b, d [identified as *Acanthotelson Eveni*]; Brooks, 1962, text plate 11, fig. a). In addition, the specimen can be distinguished from the other two Mazon Creek species as it lacks the enlarged sixth thoracomere found in *P. typus* and the posterior of its 14th thoracomere is spinose, unlike the smooth posterior of that thoracomere in *P. micra*.

Scudder's description of *Archinlus? glomeratus* was published in the *Memoirs of the Boston Society of Natural History* (Scudder, 1890a) and in *Fossil Insects of North America* (Scudder, 1890b) in the same year. It is difficult to determine which publication has priority, but Scudder himself listed the Boston Society publication first in his list of citations to *A. glomeratus* in his index to fossil insects (Scudder, 1891, p. 10) and other authors have generally done the same. Regardless of priority, both publications are virtually identical.

As *Acanthotelson stimpsonii* has recently been restudied, only an abbreviated synonymy is provided above. Additional synonyms can be found in Schram (1984, p. 205–206).

The spelling *A. stimpsonii*, as originally used by Meek and Worthen (but later abandoned by the authors) appears to be the genitive of the Latinized form of Stimpson so must be revived as the correct spelling according to Article 33.4 of the *International Code of Zoological Nomenclature* (International Commission on Zoological Nomenclature, 1999).

Scudder's two specimens of the species *Archiulus? glomeratus* Scudder, 1890a, have been considered cotypes (Schuchert, 1905, p. 61), that is syntypes. Scudder emphasized the specimen described above (which is a crustacean) in his original description, describing it first and in greater detail than the other specimen he referred to his supposed species of milliped. However, Scudder did not specifically refer to the specimen he emphasized as the type. For the sake of maintaining a stable concept of the species, I am designating the other specimen of the syntype series, which is a true milliped, as the lectotype of the species *Archiulus? glomeratus* Scudder, 1890a. And I am designating the crustacean specimen (USNM 37993) as the paralectotype of the species *Archiulus? glomeratus* Scudder, 1890a.

This partly coiled crustacean specimen does resemble a myriapod in side view, especially as seen in Scudder's figure (1890a, Pl. 37, fig. 2; 1890b, Pl. 29, fig. 2). Because of its rounded pleurites it bears a general resemblance to the milliped *Pleurojulus* Fritsch, 1899, which has recently been identified from the Mazon Creek fauna (Hannibal, 1996). However, the crustacean can easily be distinguished from a milliped based on its robust appendages and telson.

Acanthotelson stimpsonii is one of the most abundant species of fossil crustacean (Brooks, 1962, p. 230), as well as the most completely known of any fossil syncarid (Schram, 1986, p. 87). This species is most abundant in the Braidwood assemblage of the Mazon Creek fauna (Schram, Rolfe, and Hay, 1997, p. 158). Meek and Worthen published figures of *A. stimpsonii* (1866, Pl. 32; 1868, Pl. 38) that included both outstretched and partially coiled specimens. These figures were widely known and recopied (e.g., Lesley, 1889, p. 2). Nevertheless, Scudder was unable to recognize material belonging to this taxon. This might have been due to his unfamiliarity with fossil Crustacea from Mazon Creek, and in the case of USNM 37993, the relatively poor preservation of the anterior of the specimen.

Scudder's figured specimens of *Eileticus anthracinus* (in part) and *E. aequalis* (1890a, Pl. 38; 1890b, Pl. 30) are of outstretched specimens of *Acanthotelson stimpsonii* Meek and Worthen; this difference led him to distinguish these specimens from the coiled specimens he referred to *Archiulus? glomeratus* Scudder, 1890a. Thus, Scudder's failure to notice the similarity of some of his supposed myriapod material with that of Meek and Worthen's crustacean material resulted in at least two species (assuming that the holotype of *E. anthracinus* is a milliped, but that assumption is in need of investigation) of myriapod arthropod being named based at least in part on material that can be assigned to a single species of crustacean.

Class DIPLOPODA Blainville in Gervais, 1844
 Subclass HELMINTHOMORPHA Pocock, 1887
 Order ?SPROBOLIDA Bollman, 1893
 Family XYLOIULIDAE Cook, 1895a

Discussion

Hoffman (1963) included the Archiulidae of Scudder (1873) in part, the Xyloiulidae of Cook (1895a, 1895b), and the Probulidae of Fritsch (1899) in this family.

?XYLOIULUS GLOMERATUS (Scudder, 1890a)

Figure 3

Archiulus? glomeratus SCUDDER, 1890a, p. 437, Pl. 37, fig.

3; SCUDDER, 1890b, p. 413, Pl. 29, fig. 3.

Archiulus glomeratus SCUDDER, 1891, p. 10 (in part).

Material studied

USNM 37994; originally numbered 1823c/d in the Lacoe Collection (Scudder 1890a, p. 437; Scudder, 1890b, p. 413). Collected at Braidwood, Illinois, from the Francis Creek Shale, Westphalian D in age. Preserved in concretion. Composed of natural molds, with some pyritic ?replacement or cast material present.

Description of specimen

Elongate, cylindrical milliped. About 40 segments exposed, length of exposed portions about 33 mm, maximum height of body about 2.5 mm. Tapers toward posterior. Separation of prozonites and metazonites indistinct. Pleurotergites marked with fine longitudinal striae, composed of series of grooves and ridges. Eight to ten striae per 0.5 mm. Striae cross most of pleurotergite but more prominent toward middle and posterior. Striae on middle and upper part of pleurotergites curve toward dorsum anteriorly.

Remarks

Scudder (1890a, p. 437; 1890b, p. 413) described this specimen second in his description of the species *Archiulus? glomeratus* and was only "inclined to place" it in the same species as the first specimen. While most of the body is preserved, neither the anteriormost nor the posteriormost part of the body is evident, only parts of the proximal leg segments are represented, and the preservation of the specimen is only of mediocre quality. Despite these factors, I am designating this specimen, which is a true milliped, as the lectotype of *Archiulus? glomeratus* Scudder. This is being done for the sake of avoiding confusion and for maintaining nomenclatorial stability.

Although recent works (Hannibal, 1997) on the Mazon Creek fauna have noted the presence of xyloiulids, there has been little detailed work on xyloiulids since the work of Scudder (e.g., Scudder, 1873) and, more recently, Hoffman (1963, 1969). Scudder (1873, p. 239) noted the resemblance of *Archiulus* Scudder, 1868 (proposed in Dawson, 1868, p. 495, 496), and *Xylobius* Dawson (= *Xyloiulus* Cook, 1895a), distinguishing *Archiulus* by its lack of "frustra" (= striae; see also Hoffman, 1963, p. 169) and other characters. Scudder's published figures (1890c; also published in Dawson, 1878, p.

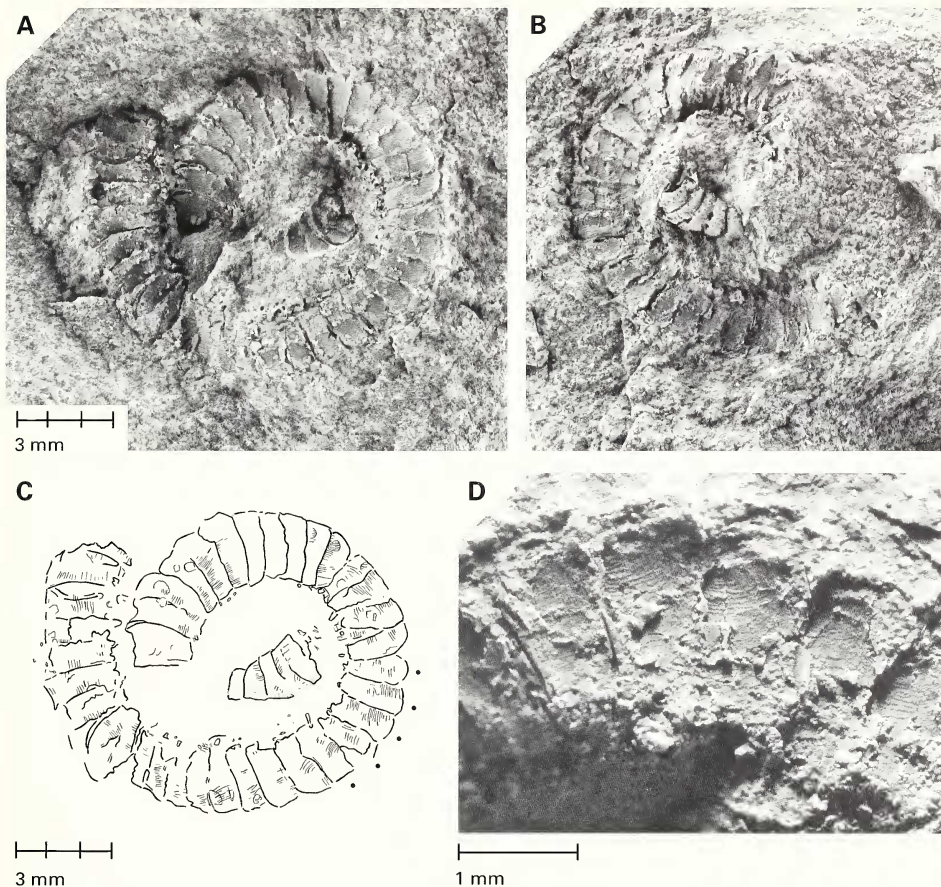


Figure 3. ?*Xyloilulus glomeratus* (Scudder, 1890a), lectotype of *Archilus? glomeratus* Scudder, 1890a, USNM 37994. A, remains preserved in one half of concretion; B, remains preserved in other half of concretion; C, camera lucida drawing of part of specimen seen in A, dots indicate segments seen in D; D, close-up of natural mold of several segments showing striae, composed of series of grooves and ridges.

56) illustrating differences between *Xylobius* (= *Xyloilulus*) and *Archilus* show little detail, but his illustrations indicate that there are more striae on the segments of *Xyloilulus* than on those of *Archilus*. Thus *Archilus? glomeratus* is tentatively assigned to the genus *Xyloilulus* Cook, 1895a, rather than to the genus *Archilus* Scudder, 1868. The species appears to have the characters of the genus *Xyloilulus* as diagnosed by Hoffman (1963, p. 171). However, the assignment

is tentative as the longitudinal grooves of the species are not distinctly continuous along the entire length of the segments as they are in certain *Xyloilulus*.

Scudder (1890a, p. 438–440; 1890b, p. 414–416) described two species of *Xyloilulus*, *Xyloilulus frustulentus* (Scudder) and *Xyloilulus mazonus* (Scudder), from Mazon Creek. Without reexamination of the type material, these species can be compared to ?*Xyloilulus glomeratus* only in

gross respects. Based on Scudder's descriptions ?*Xyloilulus glomeratus* is most like *Xyloilulus frustulentus*. Both ?*Xyloilulus glomeratus* and *Xyloilulus frustulentus* are small xyloilulids and both have closely spaced striae. According to Scudder, however, *X. frustulentus* has alternating longer and shorter segments. These appear to be lacking in ?*Xyloilulus glomeratus*. Scudder's illustrations of *Xyloilulus frustulentus* (Scudder, 1890a, Pl. 37, figs. 4-6; 1890b, Pl. 29, figs. 4-6) are inadequate for further comparison. Restudy of *Xyloilulus frustulentus* and comparison with ?*Xyloilulus glomeratus* is needed, but is beyond the scope of this paper.

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